

AD-A168 652

AUTEC CABLE ROUTE DIVE SURVEY SITE 7 ANDROS ISLAND

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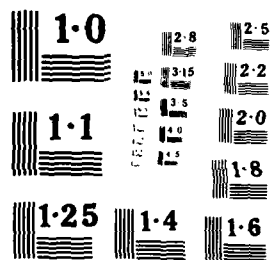
BAHAMAS (U) TRACOR/MARINE INC FORT LAUDERDALE FL  
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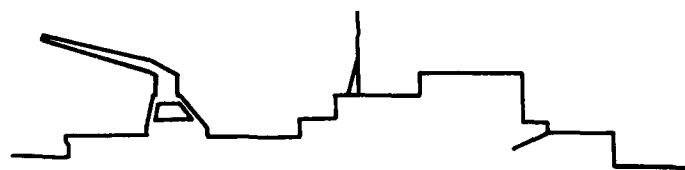


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AD-A168 652

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# Ocean Engineering

CHESAPEAKE DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
WASHINGTON NAVY YARD  
WASHINGTON, DC 20374

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Tracor Marine



1

FINAL REPORT  
AUTEC CABLE ROUTE DIVE SURVEY  
SITE 7

Submitted to:  
NAVAL FACILITIES ENGINEERING  
COMMAND

By  
TRACOR MARINE, INC.

16 August 1983

DTIC  
ELECTE  
JUN 13 1986  
S D D

**DISTRIBUTION STATEMENT A**

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FINAL REPORT  
AUTEC CABLE ROUTE DIVE SURVEY  
SITE 7  
ANDROS ISLAND, BAHAMAS

Submitted to:

NAVAL FACILITIES ENGINEERING COMMAND  
BUILDING 200  
WASHINGTON NAVY YARD  
WASHINGTON, DC 20374

CONTRACT NUMBER  
N00600-81-D-5270

TRACOR MARINE, INC.  
JOB NUMBER 723511

16 August 1983

Approved

A handwritten signature in dark ink, appearing to read 'Edward Clausner', written over a horizontal line.

Edward Clausner  
Vice President

# Tracor Marine



## TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 Summary.....	1-1
2.0 Personnel.....	2-1
3.0 General Log.....	3-1

## APPENDICES:

- A. Coordinates for Proposed Cable Route and Obstructions.
- P. Depths and Bottom Descriptions
- C. Photographs
- D. Chart of Area
- E. Proposed Cable Route Chart

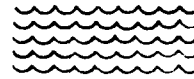


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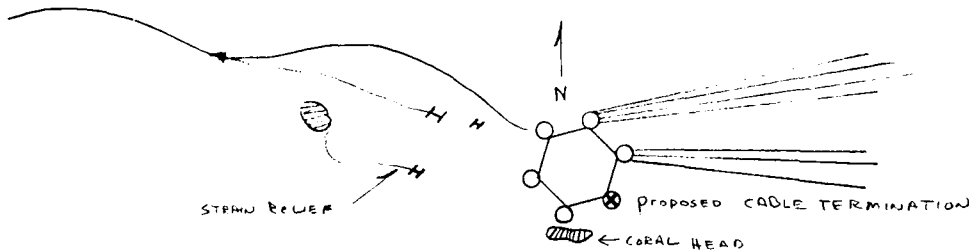
NUSC requested the following information be obtained during the dive survey, bottom types, depths, exact location of proposed cable route and obstructions, possibility of cable burial, and possibilities of termination at Dolphin.

## Tracor Marine



### DOLPHIN AND GENERAL INFORMATION

The Site 7 Dolphin is located approximately 1 mile to the northeast of Radar Boresite Tower. It is a six leg tower with platform. The northeast leg of the Dolphin has four cables and the east leg has three cables going up the piling. The southeast leg is free of cables and obstructions. The southernmost leg is obstructed by a coral head, therefore, the southeast leg is recommended for termination.



#### - Dolphin & EXISTING CABLES -

Since Site 7 is located on High Point Cay, a small island directly off Andros, the shallow reef area is not typical. The shallow reef in the proposed cable area is more of a rise from 30 feet MLW to 10 feet MLW and back to 25 feet with scattered coral patches and heads. The rise is fairly gradual as noted on the Chart. During the dive survey, a cable route was found that bypassed the coral patches and heads (See Appendix



Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

AD-A168652

1a. REPORT SECURITY CLASSIFICATION  
Unclassified

1b. RESTRICTIVE MARKINGS

2a. SECURITY CLASSIFICATION AUTHORITY

3. DISTRIBUTION AVAILABILITY OF REP.  
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2b. DECLASSIFICATION/DOWNGRADING SCHEDULE

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5. MONITORING ORGANIZATION REPORT #

6a. NAME OF PERFORM. ORG. 6b. OFFICE SYM  
Ocean Engineering  
& Construction  
Project Office  
CHESNAVFACENGCOM

7a. NAME OF MONITORING ORGANIZATION

6c. ADDRESS (City, State, and Zip Code)  
BLDG. 212, Washington Navy Yard  
Washington, D.C. 20374-2121

7b. ADDRESS (City, State, and Zip )

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9. PROCUREMENT INSTRUMENT INDENT #  
N00600-81-D-5270

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10. SOURCE OF FUNDING NUMBERS

PROGRAM	PROJECT	TASK	WORK UNIT
ELEMENT #	#	#	ACCESS #

11. TITLE (Including Security Classification)

AUTEC Cable Route Dive Survey Site 7 Andros Island, Bahamas: Final Report

12. PERSONAL AUTHOR(S)

13a. TYPE OF REPORT

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83-03-09

15. PAGES  
33

16. SUPPLEMENTARY NOTATION

17. COSATI CODES

FIELD	GROUP	SUB-GROUP
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18. SUBJECT TERMS (Continue on reverse if nec.)

Atlantic Undersea Test & Evaluation Center,  
Surveying, Oceanography, Diving, Cable  
Installation, Retrieval & Repair

19. ABSTRACT (Continue on reverse if necessary & identify by block number)

Tracor Marine was tasked by Chesapeake Division Naval Facilities Engineering Command to perform a dive survey of an area off Site 7 AUTEC, Andros Island, Bahamas. This survey was requested by Naval Underwater Systems Command (NUSC) Newport, R.I. The purpose of this survey was to locate & plot a route (Con't)

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT  
SAME AS RPT.

21. ABSTRACT SECURITY CLASSIFICATION

22a. NAME OF RESPONSIBLE INDIVIDUAL

Jacqueline B. Riley

DD FORM 1473, 84MAR

22b. TELEPHONE

202-433-3881

22c. OFFICE SYMBOL

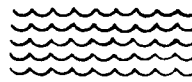
SECURITY CLASSIFICATION OF THIS PAGE

BLOCK 19 (Con't)

for a new acoustic cable to be laid from Seaward to the Dolphin and from the Dolphin to the beach off High Point Cay. At present, a cable exists from the Dolphin to the beach (36 quad cable). The new cable will be at least 40' from the old cable to prevent cross talk between cables. During hurricane David, the old cable was pushed to the north.

NUSC requested the following information be obtained during the dive survey, bottom types, depths, exact location of proposed cable route and obstructions, possibility of cable burial, and possibilities of termination at Dolphin.

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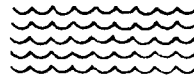


Proposed Cable Route Chart).

The bottom, almost from the Dolphin to the beach, is flat hard coral rock. The coral patches and coral heads are live coral with a maximum relief of 6 feet. These coral patches are north of the proposed cable route. Sand areas were few, with the sand only a few inches deep over hard coral rock.

The cable landing area is approximately 50 feet south of the old cable landing and the area is hard honeycombed coral, with a very sharp drop off to 4-5 feet at waters edge. From the cable landing area to the termination building is approximately 150 feet off a fairly steep rocky cliff.

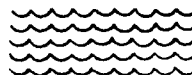
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### Navigation/Plotting

Directly north of High Point Cay approximately 2 miles, lies a small previously unnamed cay. This cay was perfectly located with the correct angle needed for the DDMU 540 Trisponder system. The cay was appropriately named "Kembro Cay" and a magnavox MX1502 satellite surveyor was used to determine an exact survey point. The second point surveyed was on High Point Cay and the coordinates were determined by the MX 1502. These locations were marked as surveyed points for future use. The 540 trisponder system was used to determine x-y coordinates and latitude and longitude of the buoys.

## Tracor Marine



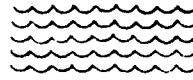
### Dive Equipment and Material

Since the maximum depth surveyed was approximately 50 feet,  
Scuba was used.

### Equipment List

1. 10 each Scuba Tanks
2. 2 12' zodiacs with motors
3. Site 7 16 foot Whaler
4. 50 concrete blocks (anchors)
5. 1200'  $\frac{1}{4}$ " poly line
6. 100 each lobster floats
7. 6 cans day glow paint red and green.
8. U/W measuring tape
9. Nikonos IV A 35mm underwater camera 100 ASA with 28 mm  
widener attached and 400 ASA with available light.
10. Mako Scuba Compressor
11. Diver's personnel gear.

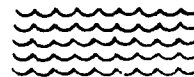
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### 2.0 PERSONNEL

- o Dennis V. Kembro - Project Manager/Dive Master
- o Len Gordon - Project Engineer/Diver
- o Richard Counter - Diver
- o Rocco Galletta - Diver
- o Stan Copeland - Electronic Technician/Surveyor  
(Consultant)

## Tracor Marine



### 3.0 GENERAL LOG

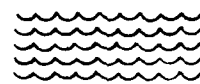
#### August 1, Monday

0700 - Arrive West Palm Beach  
0930 - Arrive Autec  
1000 - BOQ  
1100 - Check on shipment of equipment to Site 7.  
Delayed due to weather.  
1400 - Meeting, John Rose, Clark Briggs  
1700 - Secured for day

#### August 2, Tuesday

0700 - Helo all personnel to Site 7  
0830 - Arrive Site 7  
0900 - 1300 - Set up Equipment  
1500 - Dive gear arrived Site 7 by 75 boat  
1700 - Start dive survey  
Diving on coral patches, marking obstructions  
2000 - Arrive dock  
2100 - Secure for day.

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### August 3, Wednesday

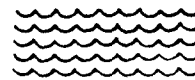
- 0600 - Start MOB equipment for dive
- 0700 - Depart dock
- 0800 - Survey Dolphin area and Seward
- 1100 - Lunch
- 1200 - 1800 - Survey rise area and near shore area
- 1300 - Set up sat. nav. on Kembro Cay.
- 1900 - Back at Dock
- 2000 - Secure for day.

### August 4, Thursday

- 0600 - Set up dive equipment.
- 0700 - One diver depart for Conus
- 0800 - Check MX 1502 on Kembro Cay
- 0800 - 1100 - Start dropping buoys for proposed cable route.
- 1100 - 1200 - Lunch
- 1200 - 1400 - Fill tanks, etc.
- 1400 - 1600 - Photos of areas surveyed
- 1600 - 1900 - Swim proposed cable route and photos
- 1900 - 2000 - Breakdown and pack most dive equipment
- 2000 - Secure.



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August 5, Friday

0600 - Set up survey equipment  
0700 - Trip to Kembro Cay set up DDMU 540 system.  
0800 - Set up Site 7 boat with 540 master and equipment  
0930 - Depart for survey area  
1000 - 1500 - Take depth, chart buoy locations  
1600 - Demob boats  
1630 - 2 divers depart for Conus  
1630 - 1900 - 1 diver demob and pack equipment  
1900 - Secure

August 6, Saturday

0600 - 1000 - Demob and pack equipment  
1000 - 1 diver depart for Site 1  
1100 - Dive survey complete.

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APPENDICES:

- A. Coordinates for Proposed Cable Route  
and Obstructions.
- B. Depths and Bottom Descriptions
- C. Photographs
- D. Chart of Area
- E. Proposed Cable Route Chart.

APPENDIX A



230 South Powerline Road, Suite #4  
P.O. Box 1042  
Deerfield Beach, Florida 33441  
(305) 421-4622 • 421-4688

August 11, 1983

Tracor Marine, Incorporated  
P.O. Box 13107  
Port Everglades, Florida 33316

Attention: Mr. Dennis Kembro (Project Manager)

Dear Dennis,

Listed below are the control sites. The sites were established using a Magnavox MX 1502 Satellite Surveyor in NAD 27; then converted to UTM Zone 18, CM 75° W, using software within the MX 1502. Datum conversions used are as follows:

a=6378206.4  
f=1/294.9786982  
b/a=1-f=.9966099247  
 $\Delta x$  +17                       $\Delta y$  -157                       $\Delta z$  -176

CONTROL SITES

Site 7                      Code 86

x 246514.56  
y 2645323.72

Lat 23° 54' 02.88"  
Long 77° 29' 23.04"

Geodetic Height = +31.49

Kembro Cay                      Code 88

x 246098.89  
y 2647666.57

Lat 23° 55' 18.75"  
Long 77° 29' 39.19"

Geodetic Height = +17.02

Sincerely,

SEA SYSTEMS CORPORATION

  
Stan Copeland

SDC:lab

# APPENDIX A



230 South Powerline Road, Suite #4  
P.O. Box 1042

Deerfield Beach, Florida 33441  
(305) 421-4622 • 421-4688

GEODETTIC & CARTESIAN COORDINATES FOR  
PROPOSED CABLE ROUTE & OBSTRUCTIONS

G15 X=246,644.5800 Y=2,645,345.290 ZONE 18 LAT=23 54 03.65 LONG=77 29 18.46	G11 X=247,243.6600 Y=2,645,689.480 ZONE 18 LAT=23 54 15.18 LONG=77 28 57.51	G21 X=247,701.1100 Y=2,645,950.020 ZONE 18 LAT=23 54 23.90 LONG=77 28 41.50	R16 X=247,772.5900 Y=2,646,118.020 ZONE 18 LAT=23 54 29.40 LONG=77 28 39.08
G32 X=246,726.7100 Y=2,645,391.460 ZONE 18 LAT=23 54 05.20 LONG=77 29 15.59	G22 X=247,328.2300 Y=2,645,737.860 ZONE 18 LAT=23 54 16.80 LONG=77 28 54.55	G25 X=247,751.0200 Y=2,645,978.230 ZONE 18 LAT=23 54 24.85 LONG=77 28 39.76	R13 X=247,635.3900 Y=2,646,086.570 ZONE 18 LAT=23 54 28.30 LONG=77 28 43.91
G7 X=246,798.8200 Y=2,645,432.610 ZONE 18 LAT=23 54 06.58 LONG=77 29 13.06	G19 X=247,404.2900 Y=2,645,777.570 ZONE 18 LAT=23 54 18.13 LONG=77 28 51.88	G24 X=247,861.9800 Y=2,646,042.820 ZONE 18 LAT=23 54 27.01 LONG=77 28 35.88	R12 X=247,636.9300 Y=2,645,892.140 ZONE 18 LAT=23 54 21.99 LONG=77 28 43.73
G35 X=246,891.7800 Y=2,645,487.400 ZONE 18 LAT=23 54 08.41 LONG=77 29 09.81	G17 X=247,461.3500 Y=2,645,812.480 ZONE 18 LAT=23 54 19.30 LONG=77 28 49.89	G26 X=247,928.6700 Y=2,646,082.240 ZONE 18 LAT=23 54 28.33 LONG=77 28 33.54	R6 X=247,562.7900 Y=2,645,963.020 ZONE 18 LAT=23 54 24.25 LONG=77 28 46.40
G23 X=247,008.0600 Y=2,645,553.100 ZONE 18 LAT=23 54 10.61 LONG=77 29 05.75	G20 X=247,575.7800 Y=2,645,875.510 ZONE 18 LAT=23 54 21.41 LONG=77 28 45.89	G27 X=248,009.0700 Y=2,646,128.460 ZONE 18 LAT=23 54 29.88 LONG=77 28 30.73	R5 X=247,436.7700 Y=2,645,871.050 ZONE 18 LAT=23 54 21.19 LONG=77 28 50.79
G28 X=247,135.3000 Y=2,645,627.990 ZONE 18 LAT=23 54 13.12 LONG=77 29 01.30	G18 X=247,638.8000 Y=2,645,912.750 ZONE 18 LAT=23 54 22.66 LONG=77 28 43.68	Dolphin Point X=248,015.0100 Y=2,646,135.560 ZONE 18 LAT=23 54 30.11 LONG=77 28 30.53	R2 X=247,360.8600 Y=2,645,930.770 ZONE 18 LAT=23 54 23.08 LONG=77 28 53.51

APPENDIX A



COORDINATES FOR PROPOSED CABLE  
ROUTE (G) & OBSTRUCTIONS (R)  
PAGE 2 OF 2

R4	CABLE END
X=247,347.0300	X=246,602.4600
Y=2,645,837.600	Y=2,645,319.420
ZONE 18	ZONE 18
LAT=23 54 20.05	LAT=23 54 02.79
LONG=77 28 53.94	LONG=77 29 19.93

R1  
X=247,298.2900  
Y 2,645,880.550  
ZONE 18  
LAT=23 54 21.42  
LONG=77 28 55.69

R3  
X=247,276.6700  
Y=2,645,828.100  
ZONE 18  
LAT=23 54 19.70  
LONG=77 28 56.42

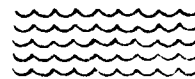
R10  
X=247,981.3200  
Y=2,646,121.120  
ZONE 18  
LAT=23 54 29.62  
LONG=77 28 31.71

R9  
X=247,973.0400  
Y=2,646,129.780  
ZONE 18  
LAT=23 54 29.90  
LONG=77 28 32.01

R14  
X=247,953.6500  
Y=2,646,133.140  
ZONE 18  
LAT=23 54 30.00  
LONG=77 28 32.69

R8  
X=247,878.27  
Y=2,646,086.84  
ZONE 18  
LAT=23 54 28.46  
LONG=77 28 35.36

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### APPENDIX B

#### Buoy Depths and Bottom Description

G = Green buoys marking proposed cable route.

R = Red buoys marking obstructions.

NOTE: Depths taken at approximately mean low water  $\pm$  one foot,

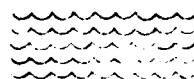
5 August 1983. All depths taken with U/W tape measure.

Tide Info: From 1983 Yachtsman's Guide to the Bahamas.

<u>Day/Date</u>	<u>AM HT</u>	<u>AM LT</u>	<u>PM HT</u>	<u>PM LT</u>
Fri. 5	4:04/2.9	10:01/0.7	4:42/3.7	11:06/0.8

<u>BUOY #</u>	<u>DEPTH</u>	<u>TIME</u>	<u>BOTTOM TYPE</u>
G-27	31'	10:46	Buoy located south edge of coral head 5' square, 3' high along the south side of Dolphin. Area directly south of buoy clear of coral heads for 50'
G-26	28'	10:48	Hard coral flat bottom.
G-24	26'	10:50	Hard coral flat bottom.
G-25	15'	10:54	Hard coral flat bottom. Start of gradual rise, hard coral flat bottom. Starting to be rough small live coral and plants.
G-21	12'	10:56	Flat hard coral, some plants. No sand.

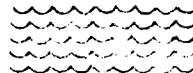
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<u>BUOY</u>	<u>DEPTH</u>	<u>TIME</u>	<u>BOTTOM TYPE</u>
G-18	10.6'	10:59	Top of rise, rocky, little live coral and plants. 1 foot relief off flat bottom.
G-20	18'	11:03	Sand over hard coral, little grass, dropping off after rise.
G-17	20'	11:06	Hard flat coral, 2" sand cover.
G-19	19'	11:10	Hard flat coral
G-22	17'	11:13	Hard flat coral, some grass, little sand.
G-11	15'	11:14	Hard flat coral, no sand.
G-28	14'	11:19	South west corner of coral patch. Flat and clear from buoy location south 50' plus, relief of coral patch 3 feet.
G-23	13'	11:22	Flat hard coral, no sand
G-35	12'	11:26	Flat hard coral, no sand
G-7	10'	11:29	Flat hard coral, no sand
G-32	8'	11:32	Flat hard coral, no sand
G-15	6'	11:34	Flat hard coral, some sand, scattered pot holes, 1 foot deep.
END	4-5'	11:39	At edge of coral beach, abrupt 4-5' drop off ragged coral beach.

NOTE: Proposed landing for cable 50' south of old cable landing.  
Directing east of cable termination building, new cable will not have to cross old cable.

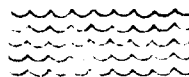
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<u>BUOY #</u>	<u>DEPTH</u>	<u>TIME</u>	<u>BOTTOM TYPE/DESCRIPTION</u>
R-9	31'	11:53	North end of strain relief I-beam, I-beam 10" 12", 1.5 ft. off bottom, strain relief cable approximately 1½" shackled to hole top of I-beam (see photo). East of R-9 approximately 12', another I-beam protrudes off bottom 10'
R-10	31'	11:54	Buoy marks south strain relief I-beam.
R-14	30'	11:57	Marks strain relief attachment to existing cable.
R-8	26'	11:59	Coral head, approximately 7' square 4 ft. off bottom.
R-16	22'	12:03	Marks existing cable, hard flat bottom, beginning of rise.
R-13	12'	12:06	Marks existing cable, rocky bottom, top of rise.
R-12	12'	12:12	Marks south edge of rocky/coral on rise, 1 ft. relief small sand patch to the north, large sand area south.
R-6	16'	12:14	South west corner of large coral patch 50' square.



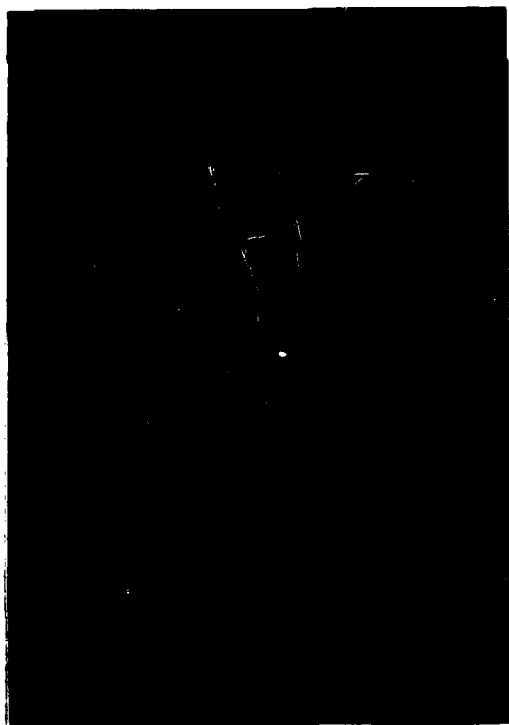
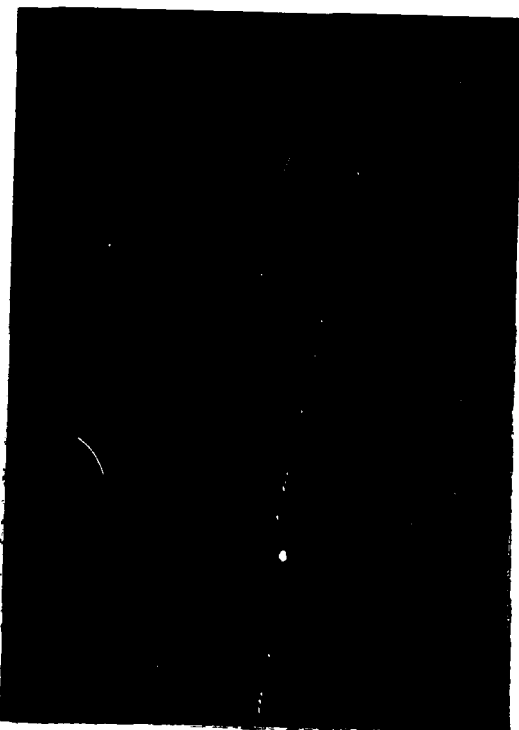
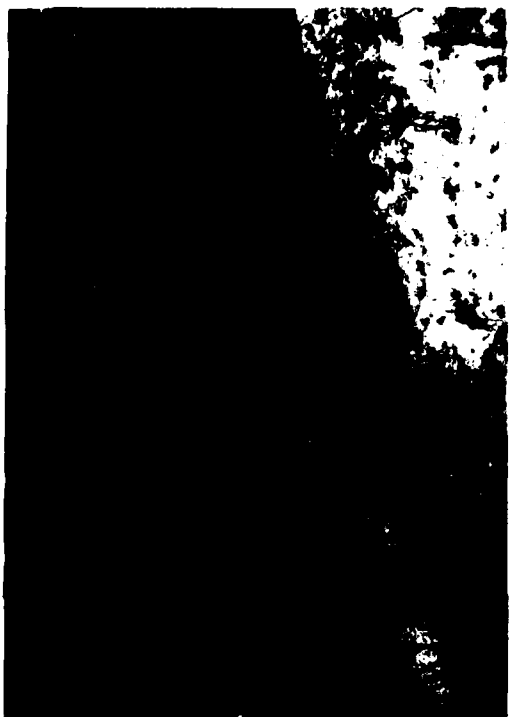
## Tracor Marine

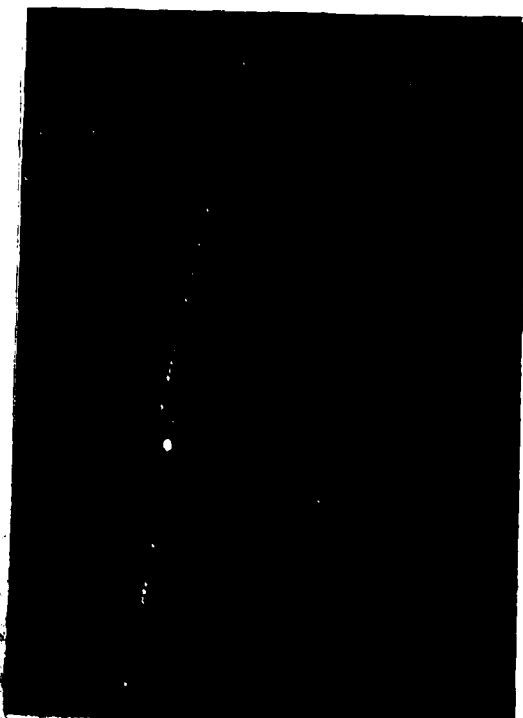
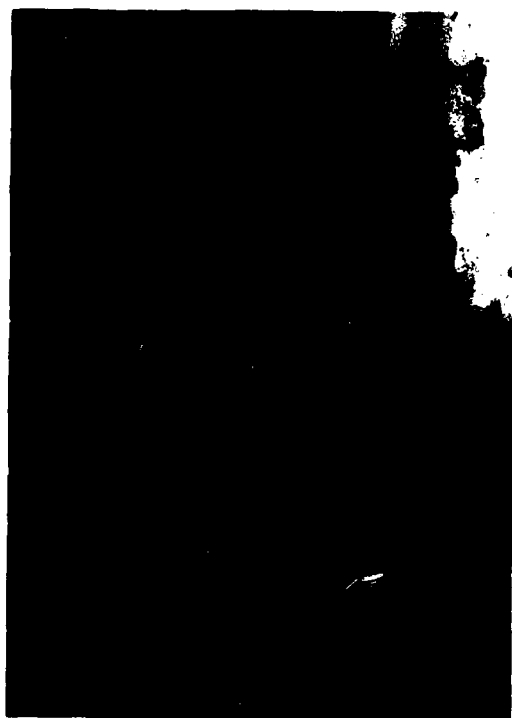


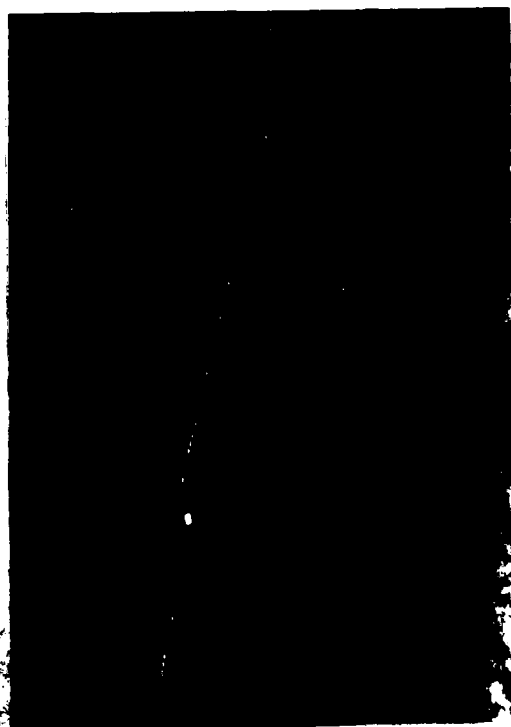
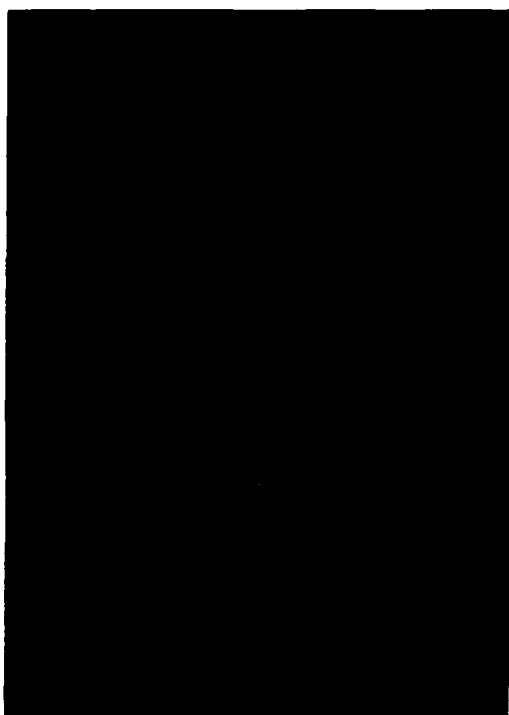
<u>BUOY #</u>	<u>DEPTH</u>	<u>TIME</u>	<u>BOTTOM TYPE/DESCRIPTION</u>
R-5	17'	12:18	Southern edge of large coral patch 6' relief - goes to buoy R-2.
R-2	17'	12:20	Northern edge of same R-5 patch.
R-4	15'	12:22	Southern edge of large coral patch. Same patch R-1
R-1	15'	12:26	Northern edge of R-4 patch.
R-3	16'	12:30	West end of coral patch area - clear to the west from this point.

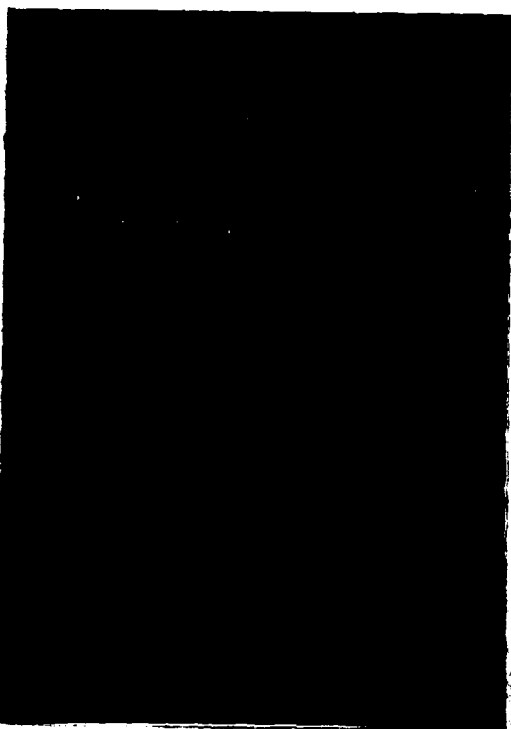
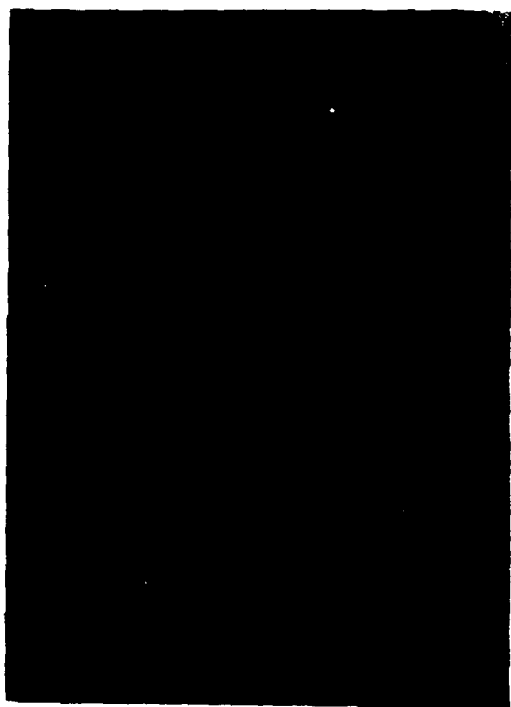


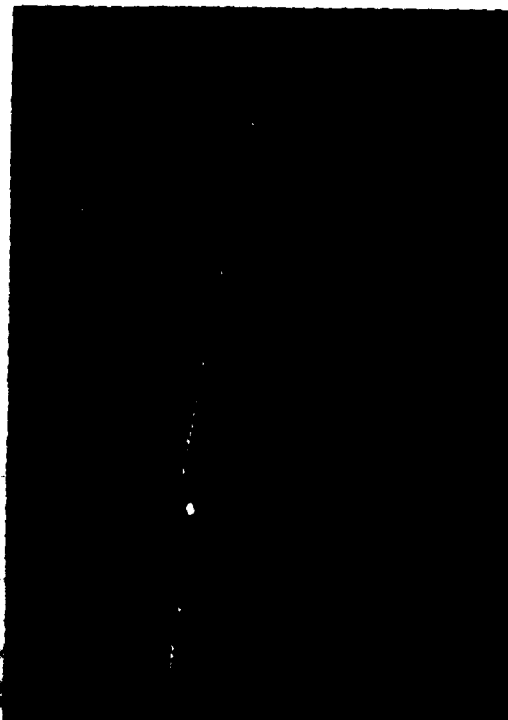
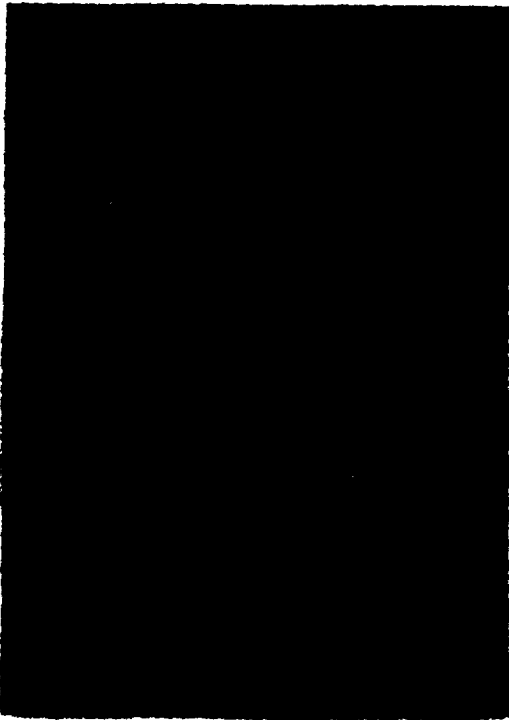
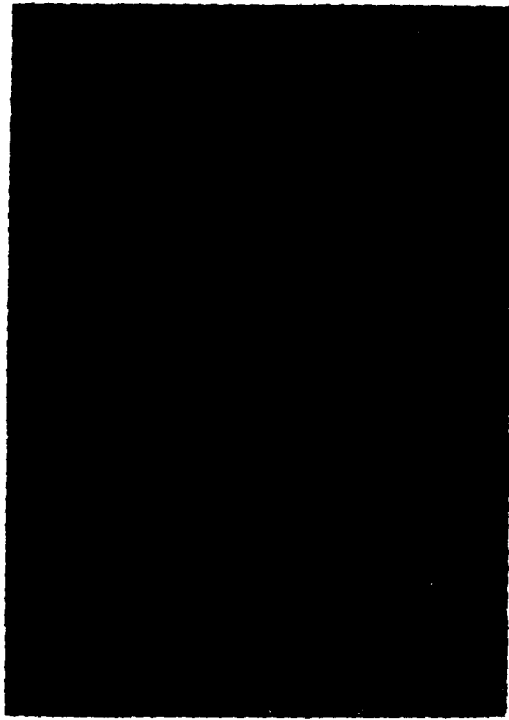




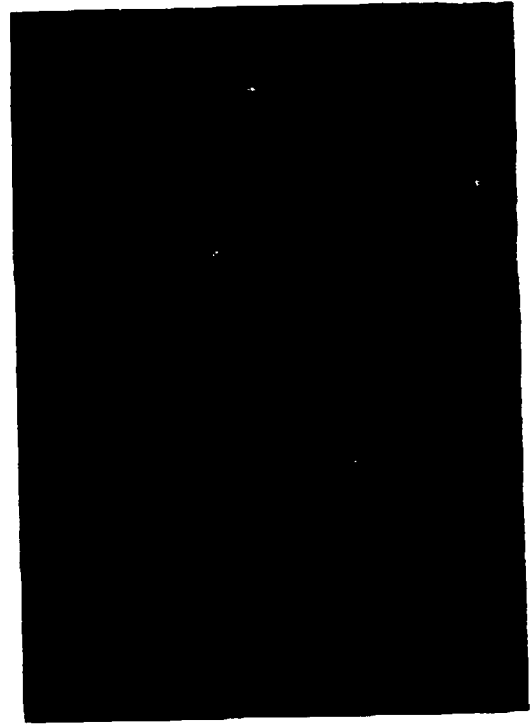


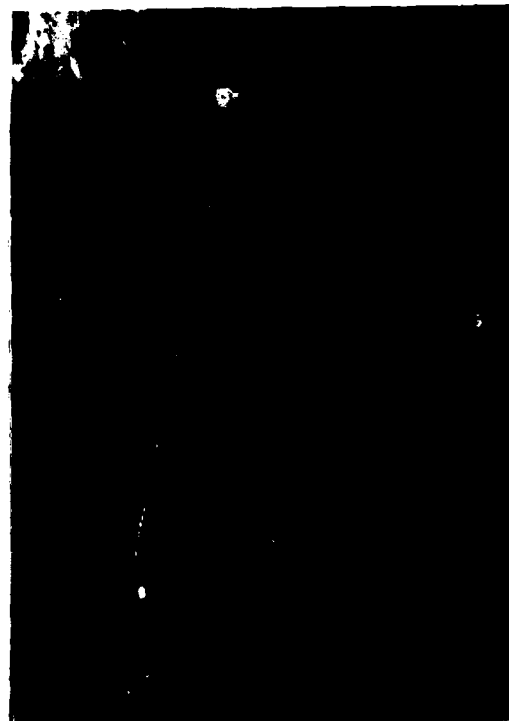
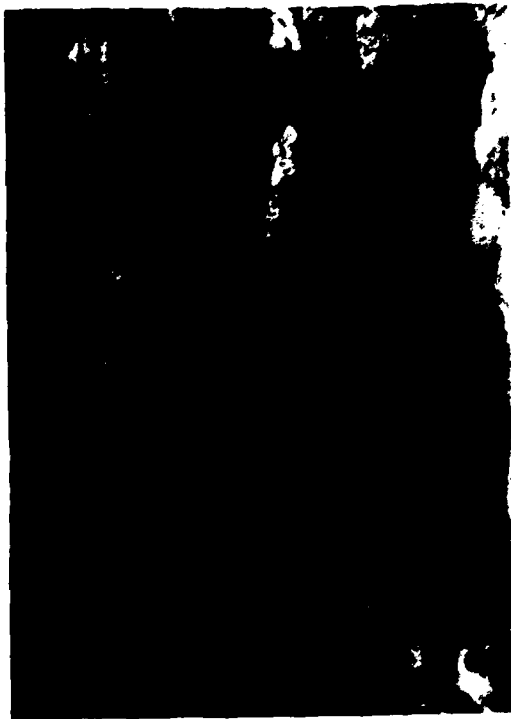


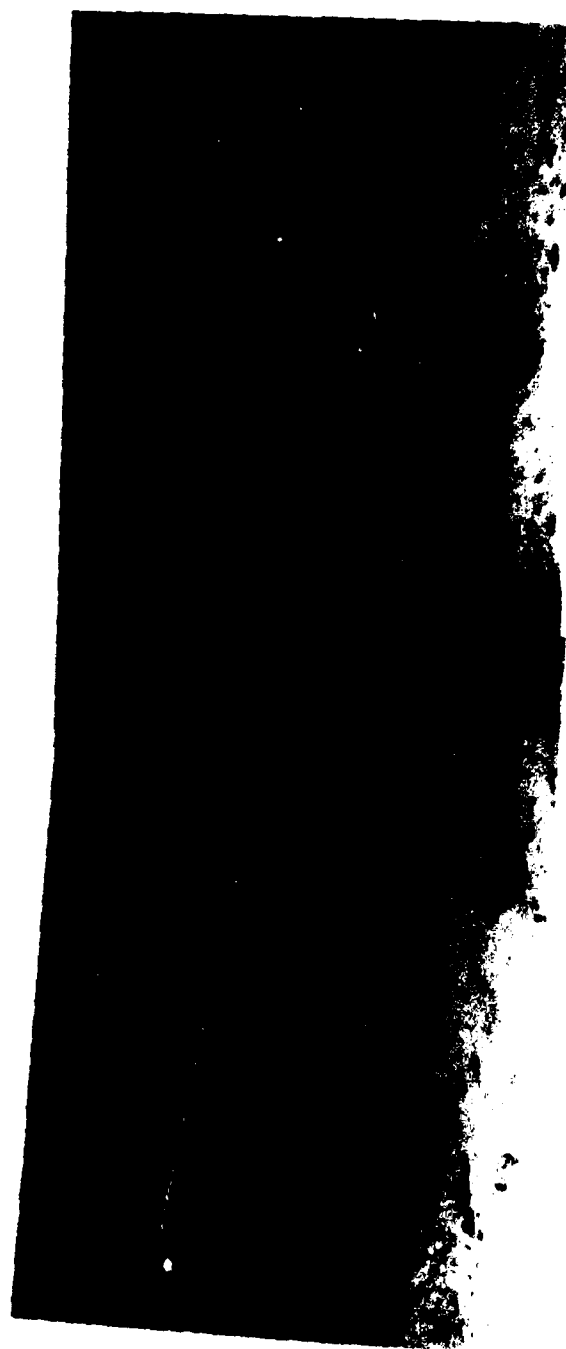
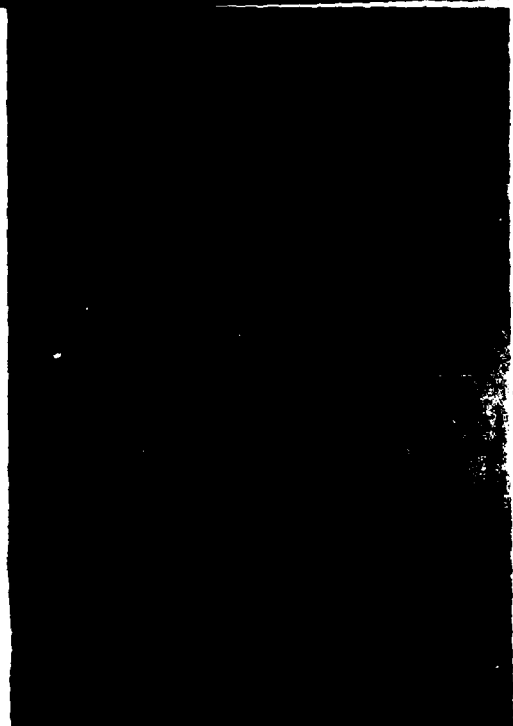
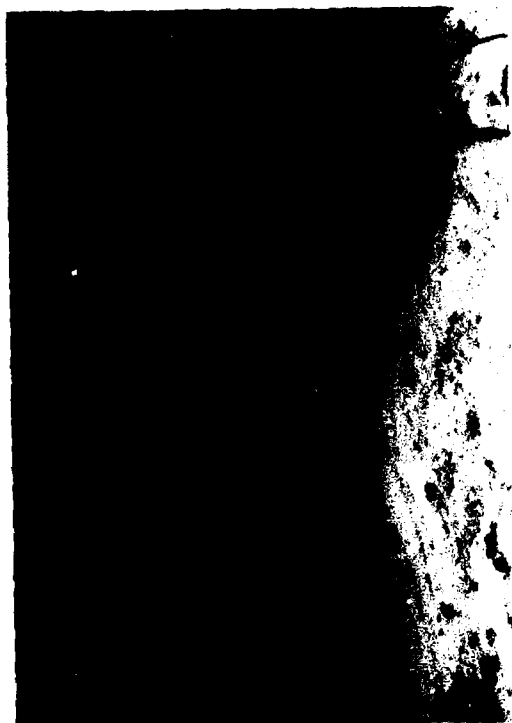


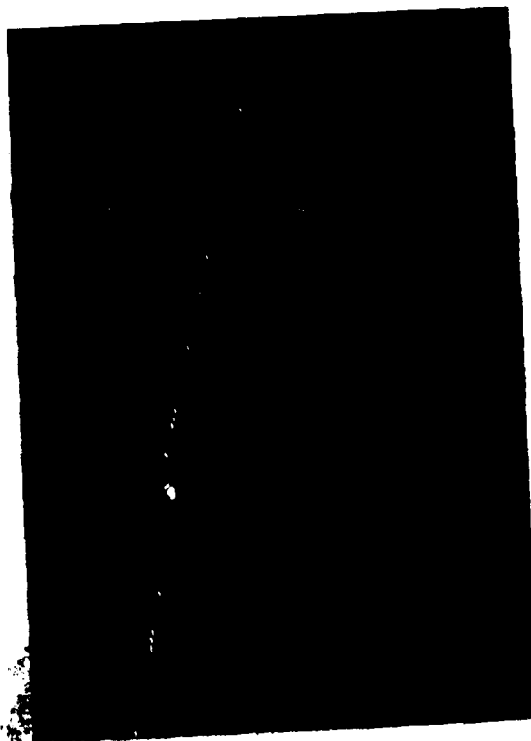
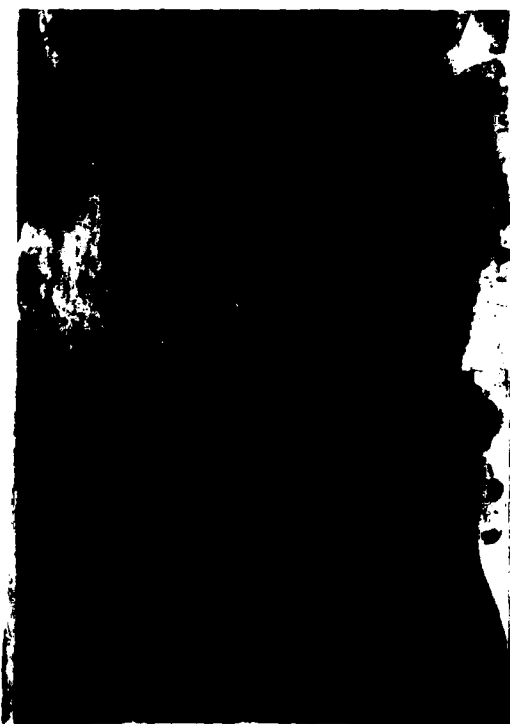
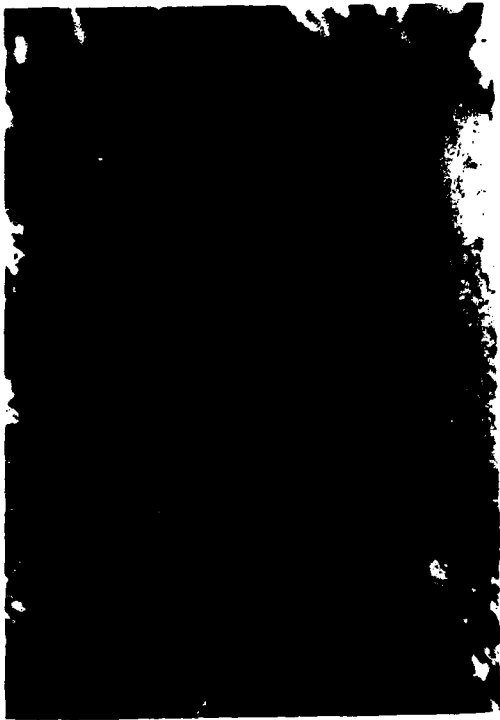














2645000  
2465

REF = LAT 23 54 18.13 LONG 77 29 36.92

2645500x

246500x

X REF: 246130

SCALE: 2400

Y REF: 2645000

SKEW: 60.0

PEN AXIS: 1200

CHART AXIS: 2200

DATE: 11-29

END 23 54 02.19/77

23 54 03.61/77

23 54 05.21/77

x

EXISTING 36 QUAD (HB-3 - MOVED N. E. TO H. 1)

x R-1 D-15

x R-4 D-15

x R-3 D-16

x G-22 23 54 16.80/77 28

x G-1 23 54 15.18/77 26

x G-28 28 54 13.12/77 29

2

x G-23 23 54 10.61/77 28

x

x G-35 23 54 08.41/77 28

2646500v

247500x

x

DAVID

x

x R-8 0-16

x 6-20 23 54 21.41.77 25

x 6-18 23 54 22.65.77 25  
x R-12 0-12

3

x 6-21 23 54 23.90.77 26

x 6-25 23 54 24.65.77 25

x R-16 0-22

x 6-24 23 54 27.01.77 26

x R-8 0-26

x 6-26 23 54 28.38.77 26

R-9 0-31  
R-14  
D-30  
x R-10 0-31

x

x 00 H1 23 54 30.15.77 26  
x 6-27 23 54 29.00.77 26

x R-5 0-17

x 6-17 23 54 19.20.77 25



2046500Y

x

4

R-9 D-31

R-14  
D-30

R-10 D-31

x DOL PT 23 54 30.1.77  
y G-27 25 54 29.63.77

x

6-26 23 54 25.11.77

x R-8 D-26

247000X

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	

\* END 23 54 02.79/77 29 19.93

246500x

2645000Y

AUTEC CABLE ROUTE SITE-7

SURVEY BY TRACOR MARINE INC

\* R-3 D-16

\* 6-22 23 54 10.60.77 26 54.55 D-17

\* 6-1. 23 54 15.18.77 28 57.51 D-15

\* 6-28 23 54 13.12.77 29 01.20 D-14

2

\* 6-23 23 54 10.61.77 29 05.75 D-12

\*

\* 6-25 23 54 08.41.77 29 09.41 D-12

\* 7 23 54 06.41.77 31 00.00 D-16

247500x

2545000x

\* 6-24 23 54 24.65/77 28 39.76 D-15

R-16 D-22

\* 6-25 23 54 24.65/77 28 39.76 D-15

\* 6-21 23 54 25.90/77 26 41 50 D-12

\* 5-13 D-12

3

\* 5-18 23 54 22.65/77 28 43.68 D-16.5  
\* R-12 D-12

\* R-6 D-16

X

\* 6-20 23 54 21.41/77 28 45.69 D-18

\* R-5 D-17  
\* 6-17 23 54 19.30/77 28 49.89 D-20

\* R-2 D-17

\* R-4 D-15

\* 6-19 23 54 18.19/77 28 51.86 D-19

\* R-1 D-15

\* R-3 D-16  
\* 6-22 23 54 16.80/77 26 54.50 D-17

X

2645300  
248000

7

646500Y

240500X

2646000Y

X

240500X

4

X DOL PT 23 54 30.11/77 26 30.11  
X G-27 23 54 29.83/77 26 30.79 D-31

R-9 D-31

R-14  
D-30

R-10 D-31

X  
/ 6-26 23 54 26.33/77 26 35.54 D-26

X R-8 D-26

8

END

DATE  
FILMED

7-86

DTA